

UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration
Washington 25, D. C.

January 7, 1947

TO ALL REA BORROWERS

SUBJECT: ALUMINUM CONDUCTORS FOR BUILDING WIRES.

Post-war shortages in copper supply have resulted in proposals for the use of aluminum wire as conductors for insulated wires and cables employed under the conditions generally covered by the National Electrical Code. Sections 1109 and 3107 of the forthcoming 1947 edition of the Code refer to the low conductivity of aluminum. However, none of the provisions of the code as to dimensions of wires, allowable currents, temperature ratings of insulation, etc., were compiled or were intended to be applied to products with conductors other than of copper.

The use of aluminum requires special consideration because of certain differences in properties and performances as compared to copper. The following notes make brief mention of some of these.

CONDUCTIVITY: The value of 84 percent of that of copper specified in Section 3107 of the Code may be accepted.

CONDUCTOR SIZES: For the conductors of branch circuits that are fused at 15 amperes; No. 12 AWG aluminum wire should be used instead of No. 14 (on this account increased size of race-ways may be necessary for the same number of wires).

Many appliances and devices with binding screw terminals will not readily accommodate No. 12 Gauge and larger size wires.

ELECTROLYTIC or GALVANIC EFFECT: Most appliances and devices have copper or brass terminals for wire connections. Because of the electrolytic effect, aluminum conductors secured to such terminals may be corroded by such contact between these dissimilar metals.

Moist atmospheres act as electrolytes, especially near the sea-coast or in "inland" industrial areas. Several of the occupancies listed in Section 3003 of the Code involve conditions favoring the electrolytic effect.

SOLDERING: Suitable solders and soldering fluxes for joints between such conductors and terminal fittings of other metals are not commonly available and the "know-how" in the use of those that are available is limited.

VOLTAGE DROP: Because of the lower conductivity the effect of voltage drop must have special consideration in layouts of wiring and loads.

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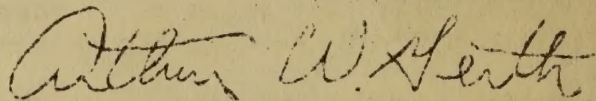
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Generally speaking it seems clear that in many areas and in various premises in perhaps other areas, conditions likely to favor corrosion troubles because of this emergency substitution may never be present. Perhaps the sum total of premises where the substitution will not add to hazards to life and property greatly exceeds that of those where trouble may be anticipated.

Underwriters' Laboratories Inc., has notified the Electrical Council and Manufacturers of Building Wires that effective September 1, 1946 Inspected R-C wire labels may be used on conductors No. 12, and larger.

The responsibility for making a decision as to whether aluminum conductors will be acceptable on consumer premises rests with the borrower and its inspectors.

TYPE "S" FUSE: The electrical committee has again deferred its mandatory action on the enforcement of the use of Type "S" fuses. This action, however, has no bearing on the mandatory recommendations contained in the REA "Specifications for Wiring," Form AL-23R. We still recommend the use of this type fuse and suggest that each borrower continue its mandatory requirements.



Arthur W. Gerth, Chief
Applications and Loans Division